000 exports from the province of Kweichow.[30]

241 313 433 Sikang Province, with a population a little over three million, is a comparatively undeveloped area. Its principal products, in addition to grain, are herb medicines and lumber. Sikang is considered one of the chief lumber centers in China. In the regions of the Ch'ing-i River, the Ta-tu River, the Ya-lung River, and the Sikang-Tibet plateau there are forests over 500 years old.[31] Lumber production[32] in Sikang in 1954 was reported to be 34 times that of 1950. However, since transportation facilities have not yet been fully developed, and lumber resources of Sikang Province cannot be fully utilized.

VI. WATER CONSERVATION AND IRRIGATION

312 The most renowned irrigation system in Southwest China is the Tu-chiang Yen (Tu-chiang Irrigation Works) in Szechwan Province. It was built in 250 B.C. by order of Li Ping, governor of Shu (Szechwan) during the Ch'in Dynasty. Li was an able administrator and

30. Ibid.
31. People's Daily, Peking, Oct. 21, 1954.
32. Ibid.

2: Rock K-5 (1934-) 1947 AF16 Southwest China AF16

I. PAI-MANG SHAN 白銘山, OR PE-MA LA

From Te-ch'in (A-tun-tzu) we follow the main road south for a short distance, then turn south-east instead of west whither the main road leads to the Mekong, and climb zigzag steeply to a gap which leads to Pai-mang Shan.[4] The slopes of the mountain are partly forested but are fast becoming denuded because the Tibetans char the wood for the use of A-tun-tzu town. We met many yak coming from Pai-mang Shan, loaded with both charcoal and firewood, destined for A-tun-tzu. From the gap the trail descends to a deep valley with a stream joined by one from Pai-mang Shan pass, both flowing west to the Mekong. Our path skirts the eastern mountain slope and emerges into a broad valley, opening out towards the Mekong. From here the entire Kha-wa-kar-po range, the Mekong—Salween divide, is visible in all its glory (PLATE 203). Two glaciers descend into the valley of the Mekong, but the river, flowing about 12,000 feet below the summit peaks, remains invisible. After passing the small hamlet called Ra-shü (Mu-lung-shu 木龍樹) where potatoes are cultivated for the A-tun-tzu market, we come to a small meadow with an old tumble-down house, and thence ascend the valley with the stream roaring about 1,000 feet below the trail.

[4] The Tibetans speak of a Pe-ma La which has, however, nothing to do with the Chinese Pai-ma 白馬 (White horse). It is the Tibetan way of pronouncing Pad-ma (the Lotus), and Pe-ma La པད་མ་ལ་ means the Lotus Pass.

The region east of Pai-mang Shan is little known and is a blank on the Davies map. There is, however, a trail which leads over the Dru La north-east to the main Yangtze divide, here called the Mu-ting Shan 慕頂山 after a village situated on the Yangtze by that name. The range is also called Jung-liu Hsüeh-shan 戎柳雪山. What seems to be a continuation of it to the north is called the Nu-lu Hsüeh-shan 怒露雪山 (Nu-lu Snow range). Over this range a pass leads to the Yangtze called Rün-tsi La. The height of this pass, the highest in this region, is said to be 16,500 feet. At Mu-ting there is a Tibetan T'u-ssu and a population of about 50 families, also a tiny lamasery; the village is about 1,000 feet above the Yangtze and about three li distant from the narrow and arid Yangtze gorge. The slopes on which Mu-ting is situated are terraced, and wheat, millet and buckwheat are grown. Of fruit trees, pomegranates, walnuts, and a small persimmon are cultivated (K. WARD).

On Mu-ting Shan grow lovely rhododendrons such as *Rhododendron Beesianum*, *Rhod. dryophyllum*, *Rhod. dumosulum*, *Rhod. schizopeplum*, etc. On the Rün-tsi La charming alpine plants abound such as *Saxifraga Wardii*, *Saxifraga flagellaris* subsp., *megistantha Paraquilegia microphylla*, *Dracocephalum Rockii*, *Saxifraga diapensia*, *Chionocharis* (*Myosotis*) *hookeri*, a forget-me-not cushion plant with tiny silvery leaves and sky-blue flowers, blue poppies such as *Meconopsis rudis* and *Meconopsis eximia*, and many others, too numerous to mention.

Beyond the Rün-tsi La to the north-east is a lower pass called the Chnü-ma La (probably the Chinese Nu-lu Shan 怒露山), whence a trail leads to Mu-ting. Yün-nan territory extends a considerable distance along the west bank of the Yangtze, forming a narrow strip with Hsi-k'ang on both sides of the river. The last village on the main road north from A-tun-tzu is Lung-ya-li 龍雀里 (MAJOR DAVIES' Lung-xang-nang), below the Tsha-le (Tsa-li 咱哩 or Ch'a-li 茶里) Pass.

The villages on the west slopes of the Yangtze valley are, from about the height of A-tun-tzu north, Sung-tiao 宋刁, K'a-sa 卡薩, Sheng-kung 雀工, the lamasery Yüan-ko Ssu 元格寺 (this lamasery was built in the 11th year of Ch'ien-lung (1746), Kung-kung 共雀, Chi-sha-k'a 吉沙卡, Lou-lung 漏龍, Ch'a-kung 查工, then the village of Ya-ra-no (Liao-la 了拉), and a pass over the Yangtze—Tsha-le River divide, 16,300 feet in height, called the Da La (Ta La 搭拉), which is also the Yün-nan—Hsi-k'ang Border.

5: Davies G-5 (1894-1900) 1909 AF16 Southwest China AF16

generals and admirals looking about for an excuse for their defeat, described our men-of-war as "sea devils," against whom it was impossible for mortal men to contend.

I slept at Shun-chiang, a village of 200 houses, which is perhaps the principal place in Hsi-lien. This district consists of a plain or plateau about 23 miles long running from north to south at an elevation which averages 6000 feet. The northern half runs down the Ku-tung Ho, and is from one to three miles wide. This river then turns off eastward to join the Shweli, and the southern part of Hsi-lien is a plateau with little tributaries of the Ku-tung Ho or of the Shweli, crossing it from west to east. Along these little streams are irrigated fields, so that in going up the plateau from south to north one crosses alternately small rice plains and bits of higher-lying uncultivated ground, covered with rocks and bushes.

The hills all round are fairly well clothed with forest, chiefly of fir trees. The range to the west rises to 9,500 feet, but that to the east is lower, with gaps through it by which the streams reach the Shweli[1]. The abundance of timber is shown by the fact that all the houses are built of wood instead of the usual soft brick. The district is decidedly a prosperous one and contributes to the volume of trade to be got out of T'êng-yüeh. Fruit-growing and sheep-rearing could be carried on very successfully here.

From Shun-chiang we went on by two easy marches to Ma-li-pa, a village in the small district of T'ien-t'ang-kuan which lies at the head of the Ku-tung Ho. Here we found shelter for mules as well as men in a water-tight but very draughty temple. The district is governed by an hereditary Chinese chief, and is of no importance except for its iron mine. This has been worked chiefly by surface-diggings, but in two places there are deeper shafts, the earth being propped up by logs of wood placed close together and supported by posts. One of these goes down forty or fifty feet.

The ore is smelted near the village, and the bellows of the furnace, as at Wan-yao, are worked by a water-wheel. The softer iron is used for the manufacture of pans, but

[1] Some of these streams run into holes in this range.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

producer of both these key minerals among all the provinces of free China. 135

While it is true that Szechuan Basin is undoubtedly the most self-sufficient and prosperous agricultural region of China, many phases of its present agricultural and forestry land use cannot be said to be wholly satisfactory from the standpoint of modern technology and scientific development. As a matter of fact, the backwardness of some of the practices is appalling. Drastic measures of improvement are urgently needed. 242 313

The efficiency of the Basin's present agricultural land use has been handicapped greatly by many natural and cultural factors. Among these are the traditional "Tung Shui Tien" system; the undependable nature and marginal character of the hilly agriculture in many parts of the Basin; the presence of large tracts of unreclaimed vacant land (particularly at the peripheral areas of the Basin); ignorance of modern scientific methods of seed selection and plant-breeding (from the irrigated alluvial plain rice to the small millet of the non-irrigated eroded soils of the upper hills); the insufficiency and failure of cotton-culture in many parts of the Basin; the periodic or aperiodic famine in the more hilly areas due to the lack of the more drought-resistant crops; the serious nature of soil-creep in many hilly areas; the failure to modernize silk-culture; the failure to cultivate and to experiment with native herbs; and above all, the lack of satisfactory and efficient irrigation system in many terraced fields of the more hilly areas. 242

In forestry land use, the most noticeable difficulties are: the lack of long-range and far-sighted forestry policy and lumber exploitation; the failure to cultivate and to experiment with tung trees; the absence of well-organized and modern-equipped plantations in tung tree production; the lack of standardization of tung tree products; and the serious hazards (due to long and difficult hauling) of transporting the wax-insects in the white-wax tree industry. 313

Transportation both within and without the Basin has been made difficult by the swift flow of many of the streams and the ruggedness of the topography. Among all the regional problems of Szechuan Basin, none is more important and more acute than the issue of transportation. The solution of this problem will promote the efficiency of agricultural and forestry as well as other forms of land use in the Basin. 489

Ti Hu K-5 (1934-) 1946 AF16 Southwest China AF16

178 As a result of the recent barbaric Japanese invasion of
722 China and the great influx of modern people and ideas from down-river into the Basin during the past few years, a renaissance has begun in Szechuan Basin. The Basin is now undergoing an economic awakening. It is in a state of rapid transition, induced and intensified by the exigencies of the war.

185 Since the migration of the National government into the
654 Basin, every possible means has been utilized and every feasible
241 plan is being drawn up to increase the efficiency of land use in the Basin. Mention may be made of a few striking examples.

In agricultural land use, various measures have been devised to cope with the inefficient traditional Tung Shui Tien field system; the acreage in Tsai Seng Tao variety rice has been extended; cotton culture has been expanded; the cultivated acreage of herb plants has been increased; more modern sugar refineries have been built, experimental stations have been established, and a number of new varieties of sugar cane have been introduced; silk-culture has been organized and operated on a more scientific basis; a number of tea-growers' cooperatives have been found recently; and above all, the practices in fertilization, terracing, erosion control, and irrigation works have been improved.

178 With the introduction of more modern methods of processing, the numerous agricultural and forestry products of the Basin are being put into more efficient utilization. The increasing manufacture of alcohol and wines from grains, the making of charcoal from wood, and the preparation of synthetic gasoline from tung oil are notable examples. These innovations not only meet the various emergent war needs, especially that of fuel supply, but also help to solve the still difficult transportation problem by transforming the bulky agricultural and forestry products into lighter and more transportable forms.

313 In forestry land use, significant improvements have already taken place. A number of large corporations, financed either by government or private interests, have recently organized to survey intensively and to exploit systematically the rich forestry
314 resources of the Basin. Numerous attempts have been made to improve tung tree production, including the establishment of more tung tree plantations and experimental stations, the supply of modern equipment, and the efficient organization of marketing facilities. Besides, the recent completion of the west branch of

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

137 Nan-chung, Cheng-ko, and Wan-yuan districts. This area is dominated by pines, banyans (Fig. 40), and cypresses, which, however, are not of very high timber value; and (5) the northwestern hilly area of the Basin, including Santai, and Chien-ke, Pai-chuan districts. This area of hilly country is dominated by pines, cypresses, some Nanmu, and some firs (Fig. 8).

313 137 Of the five areas mentioned, the Ta-tu River Valley and the Ching-I River area are by far the most important. Here virgin forests of great timber value are in abundance. Both are now under development by government and private interests. These forests will prove especially valuable for the many immediate needs in the Basin, such as construction on the Chengtu-Chungking Railway line, mining, and paper-making. Some logging activities are carried on in nearby camps, and the timber sawed is used by local towns and villages. But, however, large portions of the lumber produced are made into rafts and floated down the swift Ta-tu and Min rivers. A few saw mills, equipped with simple traditional devices, are located at Chengtu and Loshan. The wood sawed, transported either by small native boats or frequently on men's backs, found its market in various parts of the Basin, especially in the urban areas of Chengtu, Loshan, Luhsien, and other cities. Sometimes, however, such lumber finds its way as far as Chungking and other eastern areas where imported lumber often dominated the market.

The Szechuan Basin contains at least thirty different kinds of trees of high timber value in the Basin.[1] These include such outstanding and well known Chinese conifers as the Pai shu or cypress (cypressus funebris), the Ma Wei sung (Pinus massoniana), the Chia Shan (Cunninghamia lanceolata), the Ying Tsung (Abies delavayi), the Ne Tiao Shan (Picea ascendens), Hsiang Peh Sha (Juniperus Saltuaria), and a number of outstanding hard woods, such as the Nanmu (Machilu nanmu), the chestnut (Castanopsis), the Hu-tao (Juglaus rigia), the Chang (cinnamonuna camphora), and the Chu li shu (Quercus serrata).

Among all the foregoing species the Chia-shan, Ma Wei Sung, Nanmu, Hu-tao, and Pai shu are the most important. They are the most common sources of timber supply for the Basin. The

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[1] Pei Chi Heng, A Survey of the Timber Trees of Szechuan Province (1937), 26.

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Chia Shan (Cunninghamia lanceolata) deserves special mention as it is the most common tree for all-round use in the Basin. Not only because of its wide distribution throughout the Basin, particularly on the mountainous areas bordering the northwestern corner of the Chengtu Plain, but also because of its special adaptability and quick growth on the cretaceous sandstone soils, this tree has proved especially popular among farmers in the Basin. It generally grows from 80 to 120 feet tall and has a very straight stem. After the trees are cut down, this conifer reproduces itself by sprouts from the old stumps, requiring no seeding or nursery cultivation. The bark is commonly employed for roofing purposes. The wood is light, fragrant, and easily worked. For general building purposes, house-fitting, indoor carpentry, and boat-building, it is the most esteemed of all Chinese timbers. It is also in great demand for coffin-making, the fragrant properties of the wood being believed to act as a preservative.

Besides the Chia Shan, the most unique, if not the most commonly used tree, is the Nanmu (Michilus Nanmu). It is one of the most valuable broad-leaf evergreen hardwoods, comprising several species of Lauraceae. The timber is close-grained, fragrant, greenish or brownish in color, easily worked, and very durable.[1] It is the most highly prized timber for high-grade construction purposes, such as for the pillars and beams of palaces, temples, and other important structures. It is also used in the best grade furniture and cabinet work, and is commonly sought by the wealthy Chinese for making their coffins. It is among the most graceful and beautiful evergreens in the Basin. The trees are somewhat localized and are found particularly in abundance in the Min River Valley, near Chengtu Plain and some western hilly areas of the Plain where there is a dependable water supply near the irrigation streams.

In addition to the trees of the foregoing timbered areas, the bamboo thickets constitute another important source of timber supply in the Basin. The bamboo is a fast-growing plant and has many different species. The vegetative bodies and growths of the bamboo differ in these different species. Bamboo varies from the dwarf shrub of about 10 feet tall, with a diameter of 3-4 inches,

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[1]Pei Chi Heng, op. cit., p. 42.

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as in the case of Kuang Ying bamboo, to giant tree of well over 80 feet in height and with a diameter over 12 inches, as in the case of Nan Chu and Tze Chu bamboos. They often grow in thickets, groves or clumps and usually have a golden, yellow or dark green foliage and with broad sheaths. There are numerous slender stems developed around the large clumps and the principal stems. The stems are hollow inside, have many joints, and often have thick wood which furnishes the most useful part of the plant.

Bamboo has a fairly wide range of habitat and grows well under different kinds of physical conditions.[1] The principal habitats of the bamboo are in alluvial areas near streams, around farmsteads, and not infrequently on sandy soils at the hill slopes.

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The usefulness of the bamboo is indeed limitless. First of all, the tender bamboo shoots are used as a vegetable, and serve as one of the most famous Chinese delicacies. The smaller stems are used for paper-making, textile-weaving, making of boxes, baskets, chopsticks, and light house utensils and furniture, whereas the large stems are used for the construction of irrigation wheels, salt brine and gas tubes, boats, bridges, carpentry, and numerous other industrial purposes. All in all, it was once reported that the bamboos are used in more than six hundred different ways in the Basin.[2] Thus the bamboo, to be sure, plays a very important role in the economy of the Basin. Above all, the bamboo, on account of its growths of matted fibrous roots, is proved most effective in holding soil and preventing soil erosion in many hilly areas of the Basin.

There are few large bamboo plantations in the Basin. Most farmers have small patches of bamboo thickets or groves around their farmsteads. The bamboo products are used principally for the farmer's own needs and any surplus left is sold to handicraft manufacturers of the nearby areas.

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[1]Generally speaking, bamboos cannot stand up very well under drought conditions. North of Kuang Yuan, for instance, on account of the lack of sufficient moisture, and possibly also because of lower temperature during the winter, no bamboo is grown (Fig. 8). Also, generally, very little bamboo growths are found around high altitudes of probably over 5,000 feet above sea level in the Basin.

[2]T. F. Hou, "The Conditions of Salt Fields at Tze-liu-ching and Kung Ching, Szechuan," Szechuan Monthly, VIII, No. 6 (1937), 59.

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

Prior to the war a major portion of the raw varnish, about 90 per cent of the total, was exported to Japan. But now it is largely consumed within the Basin for manufacturing numerous lacquer wares, for which the Basin is famous in China. 314

E. General Conclusions

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The discussion of the agricultural and forestry land-use of the Szechuan Basin in the foregoing chapters has revealed in sharp relief three significant facts, namely: First, the dominance of the agricultural and forestry land-use in the general economy of the Szechuan Basin is not only the most striking fact but the most illuminating concept in the geography of the Basin. The very fact that the Basin has the greatest diversity of agricultural products and is almost a miniature China in agricultural production typifies its extreme agricultural richness. Moreover, the astounding figures that about 85 per cent of the total population is engaged in agricultural pursuits and over 60 per cent of the Basin's export is derived from one single forestry product, the Tung tree oil, demonstrates clearly the ever-close bond between the well-being of the people in the Basin and its agricultural and forestry land-use. In addition, it is recently revealed that the Basin supplies about 60 per cent of the total food supply for the entire fighting force of China, comprising well over five million strong. This single fact alone bears witness to the vital part the Basin now plays in China's total war effort. Among other things, this rich agricultural and forestry production of the Basin is undoubtedly one of the most important factors, perhaps the determining one, which has induced the National Government of China to select the Szechuan Basin as the principal base of operation against the present invasion.

The second conclusion deserving special attention is the close correlation of the Basin's agricultural and forestry land-use to its environmental factors. The adjustments of agricultural practices to physical environment here are both genuine and many. To mention a few striking examples, the minute terraced fields, the intricate irrigation systems, the wide range and great diversity of agricultural and horticultural products, the numerous practices in soil culture and crop rotations, and the wide use of bamboos are related respectively to the topography, water supply, climate, soil, and vegetation of the Basin. Especially the lack

7: Hu K-5 (1934-) 1946 AF16 Southwest China AF16

313 of modern technological knowledge has accentuated this relationship and has made this relationship appear overwhelming and somewhat one-sided. For instance, owing to the lack of breeding of drought-resistant varieties of crops, the hilly agriculture of the Basin has always remained precarious. Moreover, the limited engineering knowledge has prevented the farmer from obtaining a higher efficiency in their numerous irrigation works. But with the forthcoming introduction of modern technology and scientific agriculture, all these difficulties will be greatly alleviated and the Szechuanese will be able to secure a more efficient agricultural and forestry land-use and to enter into a more harmonious and reciprocal relationship with their physical environment.

Lastly, the evident trends of the rapid transformation and innovation in the various practices of the agricultural and forestry land-use, induced and intensified by the war, is a third important fact which deserves emphasis. Virtually, the Basin is now undergoing an economic and technological revolution. With the rapid influx of a great number of people with modern ideas from the lower Yangtse, there is an urgent call for greater efficiency in all phases of land-use in the Basin. Not to mention the phenomenal progress made along the manufacturing, mining, transportation and other lines, the Basin's agricultural and forestry land-use has been undergoing rapid transformation and achieving unprecedented progress. For instance, the revolutionary remedial measures regarding the traditional age-old Tung-shui-tien field system, the introduction and wide extension of the Tsa-Seng-Tao variety of rice, the drastic steps taken toward the cultures of cotton, sugar cane, tea, tobacco, and silk, and the various improvements and experimental works in connection with Tung trees and herbs, have already shattered to a great extent the fundamental structure of the agricultural and forestry land-use of the Basin. In view of the present trend of development, it is perhaps safe to say that irrespective of the outcome of the present struggle in China, the agricultural and forestry land-use of the Szechuan Basin will usher in a new era of higher efficiency and more prosperous development in the time to come.